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TITLE: Apparatus and method for selectively viewing video
information

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Abstract Text - ABTX (1):

A television presentation and editing system uses closed captioning text to locate items of interest. A closed captioning decoder extracts a closed captioning digital text stream from a television signal. A viewer specifies one or more keywords to be used as search parameters. A digital processor executing a control program scans the closed captioning digital text stream for words or phrases matching the search parameters. The corresponding segment of the television broadcast may then be displayed, edited or saved. In one mode of operation, the television presentation system may be used to scan one or more television channels unattended, and save items which may be of interest to the viewer. In another mode of operation, the system may be used to assist editing previously stored video by quickly locating segments of interest.

Application Filing Date - AD (1):

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Brief Summary Text - BSTX (22):

The television receiver/tuner receives television signals for the specified channel or channels. The closed captioning portion of the television signal is extracted by the closed captioning text decoder and converted to R digital stream of textual data. The computer then scans the closed captioning textual data stream extracted from the video signal for occurrences of words matching its search parameters.

Detailed Description Text - DETX (13):

FIGS. 4A, 4B, 4C, 4D and 4E show the format of the scan profile data structure which is used to record what type of television information the viewer wishes to identify, and to govern the operation of control program 220. Each profile record includes one profile control block 401 as shown in FIG. 4A. Profile control block 401 is the main profile record, and contains pointers which point to subsidiary records. Profile control block 401 comprises title field 402, which contains a short title of the profile for use in viewer identification. Description field 403 contains a longer textual description of the subject of the profile. Interval field 404 determines the size of an interval to be saved and recorded. It specifies the number of seconds of television signal to be saved and recorded before and after encountering a match of the search parameters. Next profile pointer field 405 and last

profile pointer field 406 contain pointers to the next and previous profile control blocks, respectively. It is expected that the video presentation system of the present invention may store multiple profiles, and that these would be stored as one or more circular linked lists of variable length, as are known in the art of computer programming. Time pointer field 407 contains a pointer to the first time control block 410 to which the profile applies. Time control blocks 410 are maintained as a linked list of variable length, allowing a single profile to specify multiple time periods during which channels should be scanned for television of interest. Keyword pointer 408 contains a pointer to the first OR-ed key word control block 430. Keywords are also maintained as a variable length linked list, permitting multiple keywords and combinations of AND-OR logic, as illustrated below in respect to FIG. 5.

Detailed Description Text - DETX (16):

The formats of OR-ed keyword block 430 and AND-ed keyword block 440 are shown in FIGS. 4D and 4E respectively. These blocks effectively specify the search parameters to be used when scanning for television data of interest. In accordance with the preferred embodiment, a user may specify one or more disjunctions of conjunctions of keywords. I.e., a user may specify a search of the form (WORD1 and WORD2) or (WORD3 and WORD4 and WORD5) or (WORD6) or . . . The number of disjunctions is variable, as is the number of conjunctions which make up each disjunction. OR-ed keyword block 430 comprises next OR-ed pointer field 431, which points to the next OR-ed keyword block of the disjunctive string; keyword 432 which contains a keyword to be matched; and next AND-ed pointer field 433, which contains a pointer to an AND-ed keyword block 440 which is part of the conjunctive string. AND-ed keyword block 440 comprises number words within field 441, which specifies a maximum distance in terms of number of words between words in a conjunctive string, I.e., the words of a conjunctive string must be within a specified proximity of each other to create a true match. AND-ed keyword block 440 further comprises keyword field 442, which specifies a keyword, and next AND-ed pointer 443, which points to the next AND-ed keyword block 440 of the string. Nulls in pointer fields 431,433,443 indicate the last word of the string.

Detailed Description Text - DETX (18):

In the example of FIG. 5, reference number 501 represents a profile control block having the same structure as profile control block 401 shown in FIG. 4A. Reference numbers 510, 513 and 516 each represent a time block having the same structure as time block 410 shown in FIG. 4B. Reference numbers 511, 512, 514, 515, 517, 518 and 519 each represent a channel block having the same structure as channel block 420 shown in FIG. 4C. Reference numbers 520 and 522 each represent an OR-ed keyword block having the same structure as OR-ed keyword block 430 shown in FIG. 4D. Reference numbers 521 and 523 each represent an AND-ed keyword block having the same structure as AND-ed keyword block 440 shown in FIG. 4E.

Detailed Description Text - DETX (23):

Keyword pointer field 408 of profile control block 501 points to the first OR-ed keyword block 520. OR-ed keyword block 520 contains the keyword "Minnesota" in keyword field 432, and contains a pointer to AND-ed keyword

block 521 in next AND-ed ptr field 433. AND-ed keyword block 521 contains the keyword "Twins" in keyword field 442, and contains the number 2 in field 441, specifying the maximum distance of the keywords. Next ANDed pointer field 443 of block 521 is null, indicating the end of the string of ANDed keywords. Blocks 520 and 521 together specify a search for the keywords "Minnesota" and "Twins", and specify that these words must be within two words of each other in a text string. This, the text "Siamese twins were born at Take Wobegone, Minn." would not satisfy the search parameters specified by blocks 520 and 521 because the words "twins" and "Minnesota" are more than two words apart in the string, whereas "The Minnesota Twins lost to Kansas City last night" would satisfy the search parameters.

Detailed Description Text - DETX (25):

Next OR-ed pointer field 431 of block 520 points to block 522, which specifies another string of keywords. Block 522 contains the keyword "Twins" in keyword field 432, and a pointer to AND-ed keyword block 523 in field 433. AND-ed keyword block 523 contains the keyword "Baseball" in field 442, and the keyword distance 30 in field 441. A null pointer in field 443 of block 523 indicates the end of the conjunctive string. Blocks 522 and 523 collectively specify a search for the keywords "Twins" and "Baseball.", which must be located within 30 words of each other in a text string. Next OR-ed pointer field 431 of block 522 is null, indicating the end of the string of OR ed keyword blocks (disjunctive string). In this example, two separate and independent (disjunctive) conditions are specified, the first by blocks 520-1, the second by blocks 522-3. If a decoded closed captioned text string satisfies either condition, the search parameters are said to be satisfied and appropriate action will be taken to save or otherwise deal with the video interval in which the string satisfying the search parameters was found, as more fully described below.

Detailed Description Text - DETX (42):

Referring to FIG. 8B, control program 220 compares a logged in text stream against the parameters of a profile to determine whether the text stream matches search criteria specified in the applicable profile at step 820. In the preferred embodiment, the search criteria comprises one or more keywords connected by logical relationships. The steps required to form a determination as to whether a match exists are represented in FIG. 9.

Detailed Description Text - DETX (43):

Referring to FIG. 9, a determination whether a match exists is made by scanning each keyword in an ORed keyword block 430 or ANDed keyword block 440 for a match against each word in the log of closed captioning text. Words in the log of closed captioning text are selected serially for matching at step 901. Control program 220 accesses profile control block 401 to obtain the keyword block at the head of the first conjunctive string (the various conjunctive strings of keywords being ORed together to form disjunctive strings) at step 902. Referring to the example of FIG. 5, ORed keyword block 520 is the first keyword block obtained. Control program 220 obtains the keyword from the appropriate keyword block for matching at step 903. In this example, keyword "Minnesota" is obtained the first time through the loop.

Detailed Description Text - DETX (44):

At step 904, control program compares the keyword obtained from the appropriate keyword block with the current word in the log of closed captioning text to determine whether the two words match. A "match" does not necessarily mean each character of the two words is identical. The keyword may optionally contain wildcard characters to broaden the scope of matches. For example, a wildcard character such as "#" may be used to indicate a variable number of letters of any kind. Such a wildcard character would normally be attached to a root word in order to match on the root and any variant of the root. For example, a keyword of "truck#" would detect a match not only for a logged word of "truck", but also for "trucks", "trucked", "trucking", "trucker", etc. Use of such wildcard characters is known in the art of computer database searching.

Detailed Description Text - DETX (45):

If the keyword and the current logged word being analyzed do not match, control program 220 then determines whether there are any additional keywords in the conjunctive string at step 905. If so, control program 220 loops back to step 903 to get the next keyword in the string. In the example of FIG. 5, control program 220 would fetch the keyword "Twins" from ANDed keyword block 521. When all the keywords of a single conjunctive string (e.g., blocks 520 and 521) have been compared to the current logged word, control passes to block 906.

Detailed Description Text - DETX (46):

At step 906, control program 220 determines whether there are any more conjunctive strings of keywords to compare against the current logged word. If so the control program loops back to step 902 to get the head of the next conjunctive string, and proceeds through blocks 903-905 to compare each keyword of the string to the current logged word. In the example of FIG. 5, blocks 522 and 523 constitute the next conjunctive string.

Detailed Description Text - DETX (47):

When all conjunctive strings have been compared against the current logged keyword, control program proceeds to step 907 to determine whether any more words from the log of closed captioning text remain to be compared to the keywords. If so, the control program loops back to step 901 to get the next word in the log. When all words in the log have been analyzed without finding a match, control program 220 returns with a determination that no match has been found.

Detailed Description Text - DETX (48):

If, while traversing the keyword blocks, control program 220 determines at step 904 that any current logged word matches a keyword, it must then determine whether all the keywords in the same conjunctive string are matched by some word in the log of closed captioning text (in order to satisfy the logical AND condition). The words in the closed captioning text must be within the proximity limit specified in proximity field 441 of ANDed keyword block 440.

Control program 220 therefore obtains each keyword in turn from the conjunctive string (step 910), scans the P most recent words of the closed captioning log to determine whether a match exists, where P is the proximity limit specified in field 441 (step 911), and determines whether all keywords in the conjunctive string have been compared to the log (step 912). If any keyword fails to match a word in the log at step 911, the conjunctive string as a whole does not match the log and control program proceeds to step 906 to determine whether any additional conjunctive strings remain to be analyzed. If all keywords in the conjunctive string are compared to the log at step 911, and a match is found for each one, then the "N" branch from block 912 will be taken at the end of the string, and control program returns with a determination that a match of closed captioning text with search parameters has been found.

Detailed Description Text - DETX (61):

Once the text strings have been built from the closed captioning data stream, control program 220 executing on CPU 202 attempts to match each text string with the keyword search parameters specified by an appropriate profile control block 401 at step 1002. This matching step is essentially the same as that performed when in automatic scan mode, and shown in FIG. 9. If a match is detected 1003), control program 220 causes storage control 210 to retrieve a segment of video at which the match was detected from storage 105, and display the video segment on monitor 106 (step 1004):

Detailed Description Text - DETX (67):

In the multiple channel scanning embodiment, control program 220 executes the same steps shown in FIGS. 8A and 8B with respect to a single channel scanning embodiment. However, multiple video signals from multiple channels are simultaneously converted to digital and written to buffer 222. Thus, block 804 of FIG. 8A may be thought of as being repeated multiple times in parallel, one for each channel being received and converted to video. The appropriate steps shown in FIG. 8B are performed separately by control program 220 for each channel being scanned. Because a match of the keyword search parameters is performed separately for each channel, there must be a separate match flag and match timer for each channel being scanned. As explained previously, control program 220 can normally complete steps 810-838 in much less time than it takes video capture unit 207 to receive and digitize a segment of video information. Therefore, there is ample time for control program 220 to serially perform the required steps separately for each channel being scanned.